An Intelligent Trainee Selection Model

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***Abstract*- This paper proposed an intelligent model that is aimed at facilitating key workers select suitable trainees for a training program. The proposed model is initiated because it has been found that many motivational training programs fail to meet their objectives because there is a mismatch between the needs of training programs and the integrity levels of trainees. The proposed model consists of three modules namely personality characteristics identification, training program requirements identification, and trainee selection agent. A dataset for the study called Trainees Integrity Dataset (TID) is mined using association rule to discover important personality characteristics. TID is obtained from Langkawi District Education Office (LDEO) and it has 1500 respondents which represents secondary school teachers in Pulau Langkawi, Kedah, Malaysia who attended a training program organized by LDEO in 2009. The proposed model is intended to produce an efficient selection process and suitable trainees.**

Keyword: selection model, intelligent, association mining, data mining.

I. INTRODUCTION

Integrity is vital to individuals, groups, organizations and society. It is a key success to everyone and many organizations have benefited enormous performance increases when their employees own good integrity behavior. As stated in [1] nothing can work without the present of integrity. Therefore, human resource department holds high responsibility to monitor integrity among its staff will always positions at good level. Providing appropriate motivation training is one of the actions can be taken to maintain the high level of integrity.

Many motivational training programs fail to meet their objectives because there is a mismatch between the needs of training programs and the integrity levels of trainees. For example, a training program to improve teachers' integrity would require those teachers that are problematic such as demotivated, indiscipline and abusive. Teachers who do not possess such negative attitudes would not be suitable for an integrity program. If this category of teachers is selected by random chance, this results in a mismatch of supply and demand of needs and cause failure in integrity training programs to achieve its goals. According to some studies, selecting the wrong person can cost businesses between 30% and 200% of a person's annual salary. If a role worth $70,000 a year is filled with the wrong candidate, it could end up costing between $21,000 and $140,000 – a loss most businesses can't afford to make [2]. Integrity refers to adherence to moral principles [7]. Measuring integrity is crucial in order to know the level of integrity and supply the right candidate for an integrity training program.

Training, also known as enabling learning and personal development is essential for an organization. It helps develop quality, customer satisfaction, productivity, morale, management succession, business development and profitability. Aspects of training include components such as: ethics and morality; attitude and behavior; leadership and determination, as well as skills and knowledge. The most important quality which makes good performers is attitudinal. Skills and knowledge, and the processes available to people, are less critical [2]. What makes people effective and valuable to any organization is their attitude. Attitude includes qualities that require different training and learning methods. Attitude stems from a person's mind-set, belief system, emotional maturity, self-confidence, and experience. Training is nothing without the motivation to apply it effectively. A strong capability to plan and manage skills training, the acquisition of knowledge, and the development of motivation and attitude, largely determines how well people perform in their training programs.

Trainee selection is the process of putting right men on right training program. It is a procedure of matching training program's requirements with the skills and characteristics of people. Effective selection can be done only when there is effective matching. By selecting best candidate for the required training program, the organization will get quality performance of employees. By selecting right candidate for the required training program, organization will also save time and money. Proper screening of candidates takes place during selection procedure.

Currently, selection is made through top-down or bottom-up approach. Top-down approach usually selects candidates randomly thus, most of the time shortlist a number of candidates who do not fit for the integrity program's

requirement. Bottom-up approach selects candidates based on their applications and m these candidates do not fit the requirements as they do not have attitude problems and just want a short break out of their routine work. Consequently, a mismatch of supply and demand of needs occurred and leads to unachieved goals.

This paper proposed an intelligent model that is aimed at facilitating key workers select suitable trainees for a training program.

This paper is organized as follows. Section 2 outlines the related works on integrality theory and training. The method of the study is discussed in section 3. The proposed model will be presented in section 4 and final sections conclude this work.

II. PREVIOUS WORKS

Measuring the score of integrity is critical because selecting candidates with appropriate level of integrity ensures better outcomes [3, 4, 6]. In addition, measures of integrity determine whether the training program should be modified or might work if it were implemented with appropriate requirements [5].

Several studies have examined strategies for measuring integrity. Howard and Howard [8] developed the Five Factor Model (FFM) which consists of five major personality traits to measure integrity. The major traits include need for stability, extraversion, originality, accommodation, and consolidation. FFM has been found to produce consistent results over the past years and is the basis of characterizing personality [9, 10, 11]. Measuring the integrity of a training candidate can help authority such as employer and training provider to identify the levels of integrity of a person. Table 1 lists the integrity traits as stated in [8].

Table 1: Integrity Traits based on Five Factor Model [8]

Traits	Characteristics
Openness (Originality, Imagination, openness to experience)	The openness of a trainee towards new experience. Human with openness is said to own more intellect, imaginative, curious, appreciative of art, and sensitive to beauty.
Conscientiousness (Will to achieve, Consolidation)	A tendency to show self-discipline, act dutifully, and aim for achievement against measures or outside expectations.
Extraversion (Positive Emotionality, Sociability)	Related to positive emotions and surgency. It has tendency to seek out stimulation, has engagement with the external world, always enjoy being with people, and often equipped with full of energy as well as an action-oriented individuals
Accommodation (Agreeableness, adaptability)	Is a social harmony traits and has tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others.
Need For Stability (Negative Emotionality, Neuroticism)	Called as emotional instability that has relation to how a trainee respond to stress, experience negative emotions

Training programs are designed for candidates that possess a certain set of requirements. Usually the requirements are divided into several components such as certain age group, characteristics of individuals, soft skills, hard skills, knowledge, and health condition. Different training programs have different requirements and identifying what requirements are needed and scoring them would allow management to know what candidates are suitable. Thus, a mechanism to identify requirements and scoring them is needed to ensure a supply of suitable candidates.

Since selection is made through top-down or bottom-up approach and these methods produced shortlisted candidates who majority do not fit for the training program's requirements. An intelligent method could automatically select suitable candidates by matching the personality characteristics with the training program requirements.

The current study aimed to extend the literature on training procedures specifically producing successful training programs through a matched demand-supply mechanism.

III. METHOD

For this study, a set of filled questionnaires (1500 respondents) was taken from Langkawi District Education Office (LDEO). The questionnaires were distributed to secondary school teachers in Pulau Langkawi, Kedah, Malaysia when they attended a training program organized by LDEO in year 2009. The questionnaire seeks answers to several key elements on integrity of: teachers: demographic background, need for stability, extraversion, originality, accommodation, and consolidation. Need for stability, extraversion, originality, accommodation, and consolidation elements are dimensions of the Big Five model, which identifies traits and structure of human personality (Digman, 1990). The filled questionnaires are input into excel and

named as Trainees Integrity Dataset (TID). The dataset, which consists of 26 columns and 1500 rows, is then preprocessed to resolve data problems such missing values, data inconsistency, and outliers. It is then transformed into nominal format. For example age of 25 to 30 is transformed into "A" and age between 31 to 35 is transformed into "B". This step is mandatory for analysis in association rule mining and is the part that implements "intelligence" to the model. The patterns generated from association mining represents as important characteristics that reflect the trainee's integrity. They will be tailored to type of training and act as a guideline for training provider to match the training requirement and candidates.

IV. PROPOSED MODELS

The propose model, named as an Intelligent Trainee Selection Model (ITTSM) is displayed in Fig. 1. The proposed model consists of three modules: personality characteristics identification, training program requirements identification, and trainee selection agent.

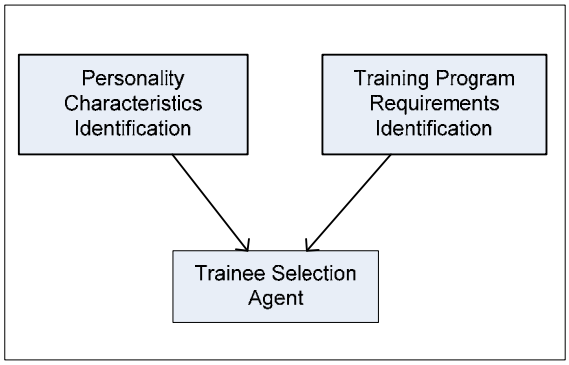

Fig. 1. The proposed model (macro level)

The goals of the intelligent model are to:

- determine the characteristics of the candidates
- determine the integrity level of the candidates
- matching the training programs needs with the identified integrity level of candidates
- determine suitable candidates

a) **Personality characteristics identification**

This module is aimed to identity important characteristics of trainees that reflect their integrity and their integrity score. The intelligence of the proposed model can be seen in this module whereby data mining technique called association rule is used to identify the characteristic. The activity of this module is separated into 3 phases namely data collection, data preparation for mining, and pattern extraction. Fig. 2 illustratively shows the personality characteristics identification module.

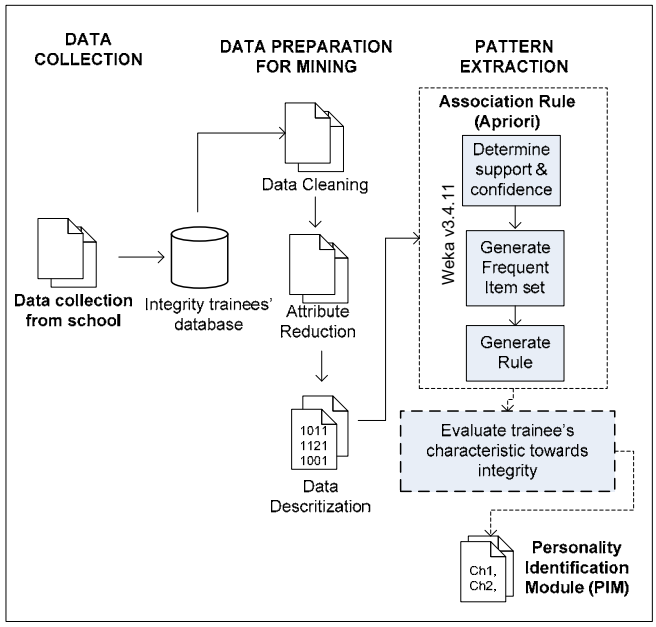

Fig. 2. The personality characteristics identification module

During pattern extraction phase, association rule algorithm called apriori in WEKA data analysis tool [12] will be used as pattern extraction tool. TID will be presented to apriori and the knowledge generated from the algorithm will represent the important characteristics of trainees' integrity. The interest in this part is to investigate the weakest integrity characteristic with the hope can guide the training provider to organize training based on the area that only required by trainee. The set of integrity characteristic is shown in table 1 and theoretically, a human is normally lack at certain part of the characteristics and has ability to change [8].

From the mining, the rules will be ranked based on support and confident threshold and only quality characteristic will be chosen for trainee selection model. The Personality Identification Module (PIM) is an output for this module.

b) **Training program requirements identification**

The aim of this module is identify the requirements needed and provide total score for the training program requirements. This module involves getting necessary information on entry criteria from the training provider and clustering that information into several components. Let say, T_1, $T_2 \ldots T_n$ are the list of training available. The training provider will identify training criteria or component; C_1, $C_2 \ldots C_n$ that required for each training such as objective of the course, age of trainees, and the main components; set of the integrity test result. Each component will be assigned with weight, w as given in $T_n = \{(C_{n1}, w_1), (C_{n2}, w_2), \ldots (C_{nm}, w_n)\}$. Then, the overall score, S_c for the training will be produced. The S_c is an accumulative score of T_n where $S_c = w_1 + w_2 + \ldots + w_n$.

The weight will be based on the expert judgment. In this study, an expert is a LDEO. The input of the module is a list

of requirements gathered from LDEO as well as an intelligent PIM which is obtained from the previous module. PIM will be a guideline for LDEO to determine suitable training program based on personality characteristic of the candidates. The output a set of training requirement segmented in several components, scores for each component, and an overall score. Fig. 3 illustratively shows the training program requirements identification

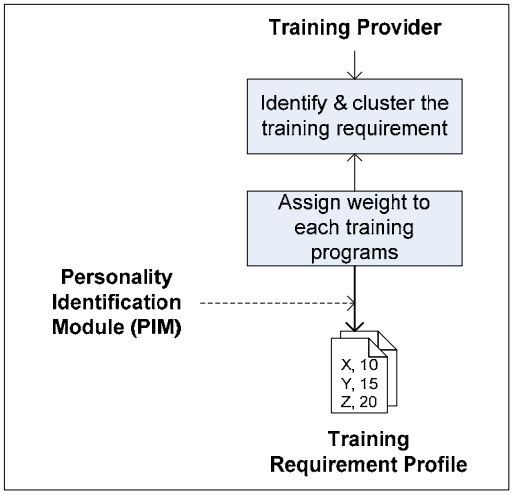

Fig. 3. The training program requirements module

c) **Trainee selection agent**

The trainee selection agent aims to obtain a shortlist of candidates. The process will involve matching candidates' personality scores with the training requirements overall score. Based on the integrity test which is required to be taken by a trainee, the result of the test will be mapped to overall score of the training. A mapping function is given as X = (R_I, S_{ct}) whereby R_I is the result of candidate integrity test result and S_{ct} is an overall score of the training t, and t is the type of training. An algorithm will be developed to perform the matching and selection. Based on matching process, a list of candidates with *ITR* for the training program will be shortlisted and ranked based on the score of candidates. Fig. 4 shows the activities involves in this module. There are two inputs required in this module that are a list of candidate profile with integrity test score and the training overall score. The output is a shortlisted of trainee.

V. CONCLUSION

The paper proposes an intelligent model aimed at facilitating key workers select suitable trainees for a training program. The model is still in the development process. The proposed model is intended to produce an efficient selection process and suitable trainees. By selecting suitable candidates for the required training program, the organization can obtain quality performance of trained employees, save time and money. The study is aimed to extend the literature on developing, successful training programs. Moreover, our future work is also to integrate the model with neural network predictor to suggest suitable training program for trainee.

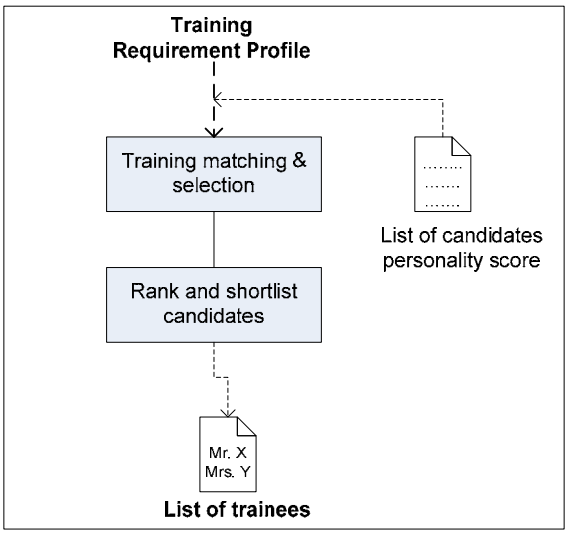

Fig. 4. Trainee selection agent

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